

ACUTE KIDNEY INJURY

Ultrasound may be useful in preventing acute kidney injury

A new study published in the *Journal of the American Society of Nephrology* reports that a noninvasive, ultrasound-based treatment might be useful for the prevention of acute kidney injury (AKI).

Few effective treatment options exist for AKI, which is an independent risk factor for mortality. Although the innate immune system is known to be involved in the development of AKI, current immunosuppressive agents are associated with adverse effects.

The recently described cholinergic anti-inflammatory pathway has been shown to modulate inflammation, and activation of this pathway has demonstrated beneficial effects in animal models of hepatic injury, myocardial ischaemia, endotoxaemia and sepsis, and ischaemia–reperfusion injury (IRI). Activation of the pathway has also been shown to attenuate the febrile response and to promote a more

prominent anti-inflammatory phenotype in humans exposed to lipopolysaccharide. “Given its efficacy in humans and the preclinical data from human tissues, the cholinergic anti-inflammatory pathway is a promising therapeutic target,” say Gigliotti *et al.*, authors of the new study, supported by National Institute of Diabetes and Digestive and Kidney Diseases–National Institutes of Health. “However, improved methods to stimulate this anti-inflammatory pathway are needed.”

Gigliotti and colleagues found that prior ultrasound exposure using a routine clinical imaging system prevented kidney IRI: they found that mice given an ultrasound protocol 24–48 h before challenge with IRI showed preserved kidney morphology and function compared with sham-treated mice.

The researchers also showed that prior ultrasound exposure

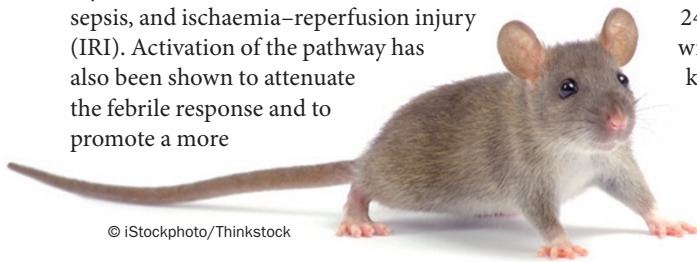
reduced kidney inflammation and long-term fibrosis after IRI.

Further investigations suggested that the spleen is the target of ultrasound-mediated tissue protection and that splenic CD4⁺ T cells are necessary for the protective effects. In addition, Gigliotti *et al.* found that a functional $\alpha 7$ nicotinic acetylcholine receptor was necessary for ultrasound to exert its beneficial effects, indicating that the cholinergic anti-inflammatory pathway is involved.

“Taken together, these results suggest that a simple ultrasound-based treatment could have therapeutic potential for the prevention of AKI, possibly by stimulating a splenic anti-inflammatory pathway,” say the authors.

Rebecca Kelsey

Original article Gigliotti, J. C. *et al.* Ultrasound prevents renal ischemia-reperfusion injury by stimulating the splenic cholinergic anti-inflammatory pathway. *J. Am. Soc. Nephrol.* doi:10.1681/ASN.2013010084



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